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TITLE: The Effect of a Home-Based Walking Intervention on Quality of Life, Body Composition, and Estrogen Metabolism in Postmenopausal Breast Cancer Survivors

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## **Introduction**

Increased incidence of and survival from breast cancer have resulted in growth of the number of women who have survived this disease and are faced with the subsequent consequences. Diagnosis and treatment of breast cancer are associated with several adverse physical and psychosocial outcomes (e.g., weight gain, reduced physical activity levels, loss of lean body mass, depression, lowered self-esteem). Some of these adverse effects are attenuated after adjuvant treatment ends. However, psychological distress and weight gain may persist, resulting in reduced quality of life and increased risk of recurrence. Physical activity participation may attenuate the adverse effects outlined above and improve hormonal factors that influence breast cancer recurrence (1). Given these benefits, it is remarkable that physical activity programs have not been adapted for breast cancer survivors until very recently. In order for physical activity to be seen as a viable treatment option, and for a change in routine care to occur, its effectiveness must be determined. Accordingly, the objectives of this pilot study are to; 1) quantify the effect of a 12-week home-based walking intervention on quality of life, body composition, and estrogen metabolism in survivors of breast cancer, and 2) develop and test the feasibility of physical activity intervention materials for future studies in this population. We hypothesize that women randomized to the walking intervention will report higher levels of quality of life, experience less weight gain, and have more favorable estrogen metabolite profiles.

## **Body**

**DESIGN.** Fifty postmenopausal women recently diagnosed with breast cancer will be recruited from the South Carolina Cancer Center (Columbia, SC). Thirty women will be randomized to a 12-week walking intervention and 20 women to a control group. The control group will be offered a walking program following the randomized experiment to allow them benefit from the intervention and improve compliance during the trial. All women will be screened for contraindications to the moderate-intensity walking program (i.e., anemia, immune suppression, extreme fatigue, bone pain, and symptoms of cardiovascular disease and orthopedic problems) and excluded as necessary. The intervention will occur after treatment is completed. Experimental groups will be balanced by stage of breast cancer and treatment type.

**INTERVENTION.** Participants randomized to the intervention will complete a 12-week home-based walking program using the Stanford model developed and refined by King and colleagues (1). Supervised home-based programs are preferred by most adults (5) and have been shown to be safe even in older ages and the obese. To maximize safety, participants will be instructed to gradually increase their walking duration and intensity. By the eighth week of the intervention, the goal will be to walk for 30-40 minutes, 5 times per week, at a moderate intensity level (i.e., 3-4 mph). Women in the intervention will have an initial in-person counseling session with a health educator that will emphasize physical activity safety (i.e., perceived exertion, warm-up, and cool-down). They also will receive 5 brief telephone calls by a health educator to monitor participant safety and enhance adherence during the 12-week intervention. Adherence will be monitored with self-report logs and pedometers. Dr. Sara Wilcox, a psychologist and Assistant Professor in Exercise Science at USC, will oversee the intervention.

**OUTCOMES.** Quality of life will be measured with the Medical Outcomes Study SF-36 that evaluates eight domains of life quality (e.g., physical, social, bodily pain, mental health). Changes in body mass and composition will be quantified with anthropometric measures and bioelectrical impedance. Estrogen metabolite levels will be measured among half of the overall sample (n=25) from spot urine samples in triplicate using the Estramet 2/16 kit (Immuna Care Corp, Bethlehem, PA). Women in the estrogen sub-study will only be included if they are overweight (i.e., body mass index > 25 kg/m<sup>2</sup>). The assay is a direct measure of 2-hydroxyestrone and 16alpha-hydroxyestrone. CYP1A2 activity, an enzyme regulating 2-hydroxyestrone formation, will be measured in urine. These markers of estrogen metabolism have been associated with breast cancer risk and physical activity levels. Changes in physical activity will be assessed by questionnaire and an accelerometer (2, 4). Outcomes will be measured at baseline, 6-, and 12-weeks. Availability of these data allow for examination of the effect of the intervention in returning women toward pre-diagnosis levels of physical and psychosocial health.

**SUMMARY.** This pilot study evaluates the effectiveness of a generalizable physical activity intervention for improving quality of life and two biologic factors associated with prognosis in postmenopausal breast cancer survivors. These data will provide the necessary quantitative estimates of outcome effect sizes that will be used for submission of a larger-scale proposal to rigorously test the hypotheses outlined above. This work has the potential to add an important new treatment option for the growing population of breast cancer survivors.

## Key Research Accomplishments

### Project Timeline

Letter of Award	December 8, 2000
Protocol submitted to DOD IRB	February 6, 2001
Notification of receipt	March 21, 2001
DOD request for revisions	May 1, 2001
Revised protocol submitted	July 11, 2001
<b>Project Coordinator hired</b>	<b>August 15, 2001</b>
HSRRB Review teleconference	August 20, 2001
Review recommendations received	August 27, 2001
Revised protocol submitted	September 10, 2001
HSRRB submits DOD IRB	
Approval internally	November 15, 2001
DOD indicates changes in institutional agreement needs to be addressed (insurance requirement)	February 2002
Pending resolution of insurance requirement	September 2002

The study team has completed the entire advance planning for the project, including development of recruitment, data collection, intervention, and data management protocols. The project coordinator (Cheryl DerAnanian) has created all necessary questionnaires and the data management system. Connections with the clinical system to facilitate recruitment have also been established. The entire study infrastructure has been in place and ready to go since the Fall of 2001.

Continued delay will further jeopardize our ability to complete the work for which we were funded.

## **Reportable Outcomes**

With the assistance of developmental funding from the South Carolina Cancer Center (SCCC) for pilot work (completed in 1999-2000), we have recruited a number of women into a 12-week walking program. The primary objective of this data collection was to evaluate the effect of increasing physical activity on estrogen metabolism in overweight/obese women with early stage breast cancer. Complete data were collected for 13 women randomized to the 12-week intervention (n=8) and usual care (control) group (n=5).

In this preliminary project, 12 of 13 women completed the 12-week study (92%). The major results of this SCCC funded work set the stage for applying for the Concept Award; which enabled us to extend our recruitment to women of all body sizes (e.g., a more generalizable sample) and to strengthen our measurement protocol by including an objective assessment of physical activity.

Preliminary results from our work is reported in detail in abstract form and by reproduction of the posters presented by: (1) Dr. Wilcox at the Society for Behavioral Medicine's 2002 annual meeting (6), and (2) by Cheryl DerAnanian, M.S. at the 2002 Era of Hope meeting (3). Dr. Matthews (PI) was not able to attend the Era of Hope meeting due to the impending birth of his second child (due early October 2002).

Funds derived through the Concept Award mechanism funded both investigators in their presentation of this research at these meetings. Both of these posters were submitted with the hope of adding the newly collected Concept Award project to the analyses. This was not possible due to administrative delays.

Cheryl DerAnanian, M.S. is the project coordinator and lead interventionist for the Breast Cancer Walking Study. She is currently a doctoral candidate in the USC School of Public Health, Department of Health Promotion Education and Behavior. The Concept Award has been one of the research projects providing her graduate stipend to support her educational and research objectives at the University.

The continued administrative delays imposed on this research project have resulted in an unfortunately high number of lost opportunities (e.g., manuscript, abstracts, presentations, educational support, translation of pilot work to grant proposals [e.g., Concept → IDEA Award], employment, and research opportunities).

## **Conclusions**

Not yet available.

## References

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6. Wilcox, S., C. E. Matthews, and A. Skiba. Adherence To A Home-Based Walking Program In Breast Cancer Survivors: A Pilot Study [abstract]. *Annals of Behavioral Medicine*. 24:S190, 2002.

## **APPENDICES**

**A.1. Society for Behavioral Medicine (2001): Abstract and Poster**

**A.2. Era of Hope (2002): Abstract and Poster**

## **A.2. Society for Behavioral Medicine (2002): Abstract and Poster**

### **ADHERENCE TO A HOME-BASED WALKING PROGRAM IN BREAST CANCER SURVIVORS: A PILOT STUDY**

Sara Wilcox, Ph.D., Charles E. Matthews, Ph.D., and Amy Skiba, M.S.  
University of South Carolina

The diagnosis and treatment of breast cancer (BC) are associated with adverse physical and emotional outcomes. Physical activity (PA) has the potential to attenuate these adverse outcomes. This presentation describes the results of a 12-week pilot walking study developed for BC survivors. Participants ( $57 \pm 13$  years; 69% Caucasian; 31% African American) were randomized to an intervention (n=8) or a wait-list control group (n=5). Intervention participants received an in-person counseling visit and follow-up telephone-calls (Mean = 4.5 calls, 13 mins/call), based on Social Cognitive Theory, that focused on goal setting, reinforcement, social support, problem solving, and safety monitoring. They also kept a daily log of mins walked, perceived exertion, and steps/day (pedometer). Average mins/wk walked were 70, 78, and 83 at 1, 2, and 3 months. Adherence (sessions completed / sessions recommended) averaged 91%, 67%, and 57% across the 3 months. Steps/day were higher on walking (7023) than non-walking (4941) days ( $p < .01$ ). Common barriers to walking were family issues, weather, work schedules, illness, and fatigue. A self-report measure of PA (CHAMPS), indicated that MET-hrs/wk walked (all types of walking) increased from baseline to 6- and 12-weeks in intervention (2.9, 12.2, 16.6) but not control participants (5.8, 5.1, 7.2); Group x Time effect n.s.; effect size  $d = 1.51$  and  $1.97$  at 6- and 12-weeks. This pilot study suggests that a home-based walking program is feasible for BC survivors, but strategies to further increase and sustain these changes over time are needed.

This study was supported by a grant from the South Carolina Cancer Center, #2000-21.

Sara Wilcox, Ph.D., Department of Exercise Science, NJA School of Public Health, University of South Carolina, Columbia, SC 29208.



# Adherence to a Home-Based Walking Program in Breast Cancer Survivors: A Pilot Study

Sara Wilcox, Ph.D., Charles E. Matthews, Ph.D. & Amy M. Skiba, M.S.

University of South Carolina, Norman J. Arnold School of Public Health, Columbia, SC

## Background

- Both the diagnosis and treatment of breast cancer are associated with adverse physical and emotional outcomes, including weight gain, fatigue, depression, and reduced physical activity
- Most interventions that focus on improving quality of life in women with breast cancer have been psychosocial in nature.
- Physical activity interventions have the potential to attenuate adverse physical and emotional outcomes in women with breast cancer (1).

## Purpose

The purpose of this presentation is to describe the development of a home-based walking intervention for breast cancer survivors and to present the results of a pilot study testing this intervention.

## Methods

- Components of the intervention included:
  - One individual, in-person counseling visit, which covered:
    - instruction in safety issues
    - discussion of program description and expectations
    - signing of a behavioral contract
    - instruction in using walking logs and pedometer
    - 12 weeks of telephone-based behavioral counseling (Mean = 4.5 calls, 13 mins/call) focused on:
      - self control (goal setting, self-monitoring, self rewards)
      - reinforcements
      - social support
      - problem solving
      - safety monitoring

## Results

- Walking logs were completed by intervention participants to assess:
  - minutes/day of walking
  - Rating of Perceived Exertion during walking sessions
  - steps/day (assessed using a Yamax® Digiwalker pedometer)

## Methods

- Participants
  - Participants were 13 postmenopausal women who were breast cancer survivors
  - 8 were randomized to an intervention group and 5 to a wait-list control group
  - Mean age was  $57 \pm 13$  years
  - 69% were Caucasian, 31% were African American

- Intervention
  - The walking intervention was modeled after programs developed at Stanford University (2) and was grounded in Social Cognitive Theory.

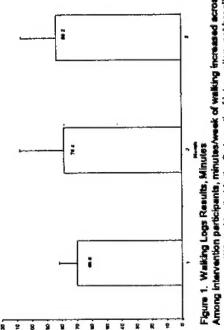
## Results

The most common barriers to walking among intervention participants were family issues, weather, work schedules, illness, and fatigue.

## Results, continued

- Data from walking logs (shown in Figures 1 & 2) indicated that time spent walking and pedometer-measured steps/day increased over the three month period for women in the intervention group.

- Adherence (actual / target walking sessions) averaged 91%, 67%, and 57% at 1, 2, and 3 months. This decline was due to an increase in target sessions over time rather than to an actual decrease in walking over time.



- A home-based walking program is feasible for women who are breast cancer survivors.
- Although significant increases in walking were seen at 6- and 12-weeks, strategies to further increase and sustain these changes over time are needed.

## References

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- King AC, Taseff HN, Young DR, et al. Long-term effects of varying intensities and formats of physical activity on participants' rates of illness, and lipoproteins in men and women aged 50 to 65 years. Circulation 1995; 91:2586-2604.
- Stewart AL, Mills MJ, King AC, et al. CHAMPS: Physical Activity Questionnaire for Older Adults: outcomes for interventions. Med Sci Sports Exerc 2003; 35:1136-1144.

## Acknowledgements

- This study was supported by a grant from the South Carolina Cancer Center, #2000-21.

- Figure 2: Walking Logs Results. Shows box plots for "Actual minutes of walking per day" across Baseline, 6-weeks, and 12-weeks. The y-axis ranges from 0 to 100 minutes. The x-axis shows Baseline, 6-weeks, and 12-weeks. The legend indicates Intervention (white box) and Control (gray box). The intervention group shows a significant increase in walking over time, while the control group remains relatively stable.

Step/day were also higher on walking (7023) than non-walking (4941) days,  $p < 0.01$ .

## Summary and Conclusions

- Data from the CHAMPS questionnaire indicated that walking (MET-hrs/wk) increased at 6- and 12-weeks in intervention but not control participants (see Figure 3).
- Figure 3: CHAMPS Walking Results. MET-hrs/wk. Walkers increased to 6- and 12-weeks from baseline. The differences between intervention and control groups represent large effect sizes ( $d = 1.51$  and  $1.97$  at 6- and 12-weeks).

## A.2. Era of Hope (2002): Abstract and Poster

### A HOME-BASED WALKING INTERVENTION AMONG BREAST CANCER SURVIVORS

C. E. Matthews, S. Wilcox, A. Skiba, S. Heiney, and C. Der Ananian  
N.J.A. School of Public Health, University of South Carolina, and the  
South Carolina Cancer Center

**PURPOSE.** This purpose of this study was to evaluate the feasibility of a home-based walking intervention among early-stage breast cancer (BC) survivors and to describe the impact of the intervention on quality of life (QOL) and physical activity (PA) levels.

**METHODS.** In this ongoing randomized pilot study we are evaluating the effect of a 12-week walking intervention (recruitment goal N=50). Participants were randomized to a home-based walking intervention adapted from the Stanford model (n=8), or a wait-list control group (n=5). Intervention participants received an in-person counseling visit and follow-up telephone-calls (mean = 4.5 calls, 13 min/call) that focused on goal setting, reinforcement, social support, problem solving, and safety monitoring. Daily walking logs and pedometers were employed as self-monitoring tools. Outcome measures were the SF-36 and CHAMPS PA questionnaires.

**RESULTS.** To date, 12 of 13 (92%) women have completed the study (age 57 ± 13 years; 69% Caucasian; 31% African American). Baseline SF-36 indices for physical function, role-physical, and vitality were 20-40% below normative values for US women of similar age (55-64 yrs). No significant QOL changes were noted in response to the intervention in these preliminary analyses. Overall PA increased from baseline to 6- and 12-weeks in the intervention (2201, 3280, 3989 kcal/wk) but not control participants (1912, 1844, 2098 kcals/wk); Group x time p = 0.48. Walking increased from baseline to 6- and 12-weeks in the intervention (357, 1173, 1588 kcal/wk, p < 0.06 vs. baseline) but not control participants (358, 296, 466 kcals/wk, p > 0.82 vs. baseline); Group x time p = 0.19. Pedometer readings were higher on walking than non-walking days (7023 vs. 4941 steps/d, p < 0.01). Adherence to the walking intervention goals averaged 91%, 67%, and 57% across 3 months.

**CONCLUSION.** Preliminary results suggest that home-based walking programs are feasible for early-stage BC survivors and can increase PA levels. Accordingly, home-based walking programs have the potential to assist women in combating the adverse emotional and physical outcomes associated with the diagnosis and treatment of BC.

The U.S. Army Medical Research and Materiel Command under DAMD17-01-1-0628 and the South Carolina Cancer Center #2000-21 supported this work.



# A Home-based Walking Intervention Among Breast Cancer Survivors

Charles E. Matthews, Ph.D., Cheryl Der Ananian, M.S., Sara Wilcox, Ph.D., Amy M. Skiba, M.S., And Sue Heiney, Ph.D.

Norman J. Arnold School of Public Health, University of South Carolina, and the South Carolina Cancer Center, Columbia, SC

## Methods, continued

### Abstract

**PURPOSE:** The purpose of this study was to evaluate the feasibility of a home-based walking intervention among early-stage breast cancer survivors and to describe the impact of the intervention on quality of life (QOL) and physical activity (PA) levels.

**METHODS:** In this ongoing randomized pilot study, we are evaluating the effect of a 12-week walking intervention (recruitment goal N=50). Participants were randomized to a home-based walking intervention adapted from the Stanford model (n=5), or a wait-list control group (n=5). Intervention participants came to an in-person counseling visit and follow-up telephone calls (mean 4.5 calls, 13 minutes) that focused on goal setting, reinforcement, social support, problem solving, and safety monitoring. Daily walking logs and pedometers were employed as self-monitoring tools. Outcome measures were the SF-36 and CHAMPS PA questionnaires.

**RESULTS:** To date, 12 of 13 (92%) women have completed the study (age 57 ± 13 years; 65% Caucasian, 31% African American). Baseline SF-36 indices for physical function, role physical, and vitality were 20-40% below normative values for US women of similar age (55-64 yrs). No significant QOL changes were noted in response to the intervention in these preliminary analyses. Overall PA increased from baseline to 6- and 12-weeks in the intervention (2201, 3240, 3899 kcal/wk) but not control participants (1742, 1844, 2098 kcal/wk). Group x time p = .46. Walking increased from baseline to 6- and 12-weeks in the intervention (357, 1173, 2166 kcal/wk, p < 0.05 vs. baseline). Group x time p = 0.19. Pedometer readings were higher than walking days (7023 vs. 4944 steps/day, p = 0.01).

**CONCLUSION:** Preliminary results suggest that home-based walking programs are feasible for early-stage BC survivors and can increase PA levels. Accordingly, home-based walking programs have the potential to assist women in combating the adverse emotional and physical outcomes associated with the diagnosis and treatment of BC.

## Background

Both the diagnosis and treatment of breast cancer are associated with adverse physical and emotional outcomes including weight gain, fatigue, depression and reduced physical activity.

Physical activity interventions have the potential to attenuate the adverse physical and emotional outcomes in women with breast cancer (1).

## Purpose

To evaluate the feasibility of a home-based walking intervention among early-stage breast cancer (BC) survivors and to describe the impact of the intervention on quality of life (QOL) and physical activity (PA) levels.

## Methods

### Participants

Participants were 13 post-menopausal women who were breast cancer survivors (Recruitment goal N=50)

### Intervention

The walking intervention was modeled after programs developed at Stanford University (2) and was grounded in Social Cognitive Theory.

## Results, continued

### Components of the intervention included:

One individual in-person counseling visit which covered: instruction in safety issues, discussion of program description and expectations, signing of a behavioral contract and instruction in using walking logs and pedometer.

12 weeks of telephone-based behavioral counseling (Mean = 4.5 calls, 13 mins/call) focused on: self control (goal setting, self-monitoring, self-rewards), reinforcements, social support, problem solving and safety monitoring.



### Measures

The CHAMPS Physical Activity Questionnaire for Older Adults (3) was self-administered at baseline, 6-, and 12-weeks. Kcal/wk spent in overall PA and walking are reported here.

The SF-36 (4) was self-administered at baseline, 6- and 12-weeks. Indices for physical function, role physical and vitality are reported here.

Adherence was determined from the walking logs as actual walking sessions/target walking sessions.

## Results

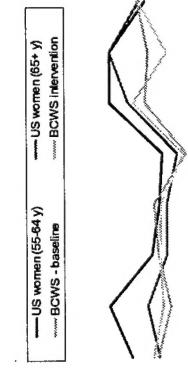
To date, 92% of the women have completed the study. Basic characteristics of the participants are provided in table 1.

Table 1. Descriptive Characteristics of Participants	
Characteristic	Intervention (n=13)
Age (years)	59.2 ± 13.1
Height (in)	58.10 ± 13.1
Body Mass Index (kg/m <sup>2</sup> )	23.6 ± 3.9
African American	n = 1
Caucasian	n = 12
Time between diagnosis and study entry (years)	33.4 ± 37.6
Breast Cancer Diagnosis *	
TMN Stage I	n = 2
TMN Stage II	n = 2
TMN Stage III	n = 1
Not Staged	n = 8
Treatment Received *	
Chemotherapy	n = 2
Both Chemotherapy and Radiation	n = 1
Radiation Only	n = 1
None	n = 0

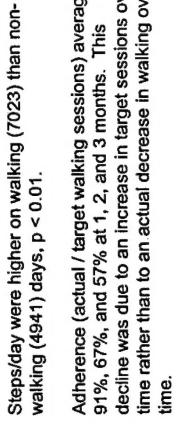
\*Descriptive treatment information available on 4 of the intervention participants and all 5 control participants

## Results, continued

Baseline SF-36, indices for Physical Function (PF), Role Physical (RP) and Vitality (VT) among participants were 20 – 40% below the normative values for U.S. women age 55-64 (Figure 1).



**Figure 2. Champs Overall PA results, kcal/wk**



**Figure 3. Walking Results, kcal/wk**

Steps/day were higher on walking (7023) than non-walking (4941) days,  $p < 0.01$ . Adherence (actual / target walking sessions) averaged 91%, 67%, and 57% at 1, 2, and 3 months. This decline was due to an increase in target sessions over time rather than to an actual decrease in walking over time.

## Summary and Conclusions

- Preliminary results suggest that participation in a home-based walking program increases overall PA among early stage breast cancer survivors.
- A home-based walking program is feasible among early stage breast cancer survivors and is effective at producing short-term changes in PA.
- Home-based walking programs have the potential to assist women in combating the adverse emotional and physical outcomes associated with the diagnosis and treatment of BC.

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3. Stewart AL, Mills KM, King AC, et al. CHAMPS Physical Activity Questionnaire for Older Adults: outcomes for interventions. *Med Sci Sports Exerc* 2001; 33:1125-1141.

## Acknowledgements

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